FROM PREVENTION AND MITIGATION TO ASSESSMENT AND COMPLAINTS

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| [**Good Practice Guide Introduction**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/GoodPracticesGuideIntroduction.aspx) | [**Understanding Odour**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/UnderstandingOdour.aspx) | [**Odour Prevention and Mitigation**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/OdourPreventionandMitigation.aspx) | [**Odour Assessment**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/OdourAssessments.aspx) | [**Odour Management**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/OdourManagement.aspx) | [**Odour Complaints**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/OdourComplaints.aspx) |



INSIDE THE GUIDE

The *Good Practices Guide for Odour Management in Alberta* outlines good practices related to odour management and was developed to serve as a reference on odour issues and their management. It explains some of the most commonly used tools in odour management and provides guidance on the general situations and circumstances in which the tools may be most effective.

* + [**Acknowledgements**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/GoodPracticesGuideIntroduction.aspx#acknowledgements)
	+ [**About This Guide**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/GoodPracticesGuideIntroduction.aspx#about)
	+ [**Background**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/GoodPracticesGuideIntroduction.aspx#background)
	+ [**Download the complete Good Practices Guide for Odour Management in Alberta**](http://casahome.org/Portals/0/DMX/OMT%20GPG/CASA_GPG_webversion_V3.pdf?timestamp=1444833907813)

A [**glossary of terms**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/GoodPracticesGuideIntroduction.aspx#glossary), [**a list of acronyms**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/GoodPracticesGuideIntroduction.aspx#acronyms) and [**a list of references**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/GoodPracticesGuideIntroduction.aspx#references) (with links to the full reports) are provided for easy reference.

CONTENT OVERVIEW

Odours are one of the most common air quality complaints and can directly and indirectly affect health and quality of life. Odour-related conflicts often arise when residential and recreational activities and industrial, municipal, agricultural and/or commercial activities converge. Odour complaints often necessitate odour management activities.

Odours and their sources are diverse and managing them is often not an easy undertaking. Understanding how odours are perceived is an important first step. While preventing odours is desirable, it is not always possible, and it becomes important to understand the tools and approaches that can be used to assess, mitigate and manage odours and odour concerns.

The guide covers the following topics:

[**Understanding Odour**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/UnderstandingOdour.aspx)

An important step in managing odour is developing an understanding of its properties, frequency and duration of occurrence, sources, and impact on health and well-being.

[**Odour Prevention and Mitigation**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/OdourPreventionandMitigation.aspx)

Prevention and mitigation can be described as a suite of tools used to prevent or lower odorant emissions or reduce the occurrence of adverse odour effects.

 [**Odour Assessments**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/OdourAssessments.aspx)

Odour assessments are conducted for a variety of reasons, and there are a wide variety of odour assessment tools and approaches available.

[**Odour Management**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/OdourManagement.aspx)

Odour management involves the application of the appropriate tools to understand and effectively manage odour.

[**Odour Complaints**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/Complaints.aspx)

Receiving, understanding and effectively addressing odour complaints is a very important part of odour management.

ACKNOWLEDGEMENTS

This guide is made possible thanks to the hard work and commitment of the members who sat on the Clean Air Strategic Alliance [**Odour Management Project Team**](http://casahome.org/CurrentInitiatives/OdourManagementTeam.aspx) and these task groups:

* 1. Complaints Task Group
	2. Enforcement and Role of Regulation Task Group
	3. Health Task Group
	4. Odour Assessment Task Group
	5. Prevention and Mitigation Task Group

The reports produced from their work are the basis of this guide

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Hard copies of this guide are available by contacting CASA at **casa@casahome.org**.

 CASA welcomes feedback on the usefulness and content of this guide. Please provide comments to CASA by email at **casa@casahome.org**.

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ABOUT THIS GUIDE

This guide outlines good practices related to odour management and was developed to serve as a reference on odour issues and their management.

* + The guide is not intended to offer specific odour management recommendations or regulatory requirements.
	+ It does provide information that can guide the development of such recommendations or requirements.
	+ Organizations are responsible for knowing the odour-related regulations and requirements that affect their operations.

The content in this guide was extracted from the following reports, which were prepared for the Clean Air Strategic Alliance (CASA) through task groups formed by the [**CASA Odour Management Team**](http://casahome.org/CurrentInitiatives/OdourManagementTeam.aspx)

* + [***Odour and Health Backgrounder***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/Odour%20and%20Health%20Backgrounder_FINAL%2030JAN2015.pdf?timestamp=1436886776432)
	+ [***Odour Complaints in Your Area: A Guide for Developing an Odour Complaint Process***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/Odour%20Complaints%20in%20Your%20Area%20Booklet%20_APR2015_Final.pdf?timestamp=1436886825983)
	+ [***Report to the Clean Air Strategic Alliance Odour Management Team Enforcement/Role of Regulation Task Group***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/ERoRTG%20RWDI%20Review%20Final%20Report%20150311%20CASA.pdf?timestamp=1436886730219) which was prepared by RWDI AIR Inc.
	+ [***Review of Odour Assessment Tools and Practices for Alberta***](http://casahome.org/LinkClick.aspx?fileticket=P-9teU5NWU4%3d&portalid=0&timestamp=1436887677750) which was prepared by Millennium EMS Solutions Ltd., and Environmental Odour Consulting
	+ [***Review of Odour Prevention and Mitigation Tools for Alberta***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/PMTG%20Pinchin%20Final%20Report%20w%20Appendices%202015-01-27.pdf?timestamp=1436886856110) which was prepared by Pinchin Ltd.

As such, this guide represents a compilation and summary of key information from more comprehensive “topic specific” documents. While much of the source information was developed with Alberta in mind, the information included in this guide is considered to be generally applicable to a broad range of odour-related issues.

The [**reports are available online**](http://casahome.org/CurrentInitiatives/OdourManagementTeam.aspx) for those who wish to explore any of the topics or tools in more depth, review the charts and tables, or consult the references and source documents.

A [**glossary**](http://casahome.org/CurrentInitiatives/GoodPracticesGuideforOdourManagementinAlberta/GoodPracticesGuideIntroduction.aspx#glossary) has also been provided to define terms that are used in the context of this guide.

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BACKGROUND

The issue of odour management came to the attention of the Clean Air Strategic Alliance through its government, non-government and industry stakeholders. Various odour management issues have been identified by CASA project teams and stakeholders over the years and, in September 2012, the CASA Board agreed to establish a multi-stakeholder working group to further screen and scope the issue and draft a project charter.

The Odour Management Working Group, formed in January 2013, designed a process that would assist a larger group of stakeholders to engage in a focused discussion to advance odour management in Alberta. The working group obtained regular feedback from its sector members and this input was incorporated into the [**project charter**](http://casahome.org/Portals/0/documents/Odour%20Management/Project%20Charter/Odour_ProjectCharter_to%20Board_27MAR_approved.pdf?timestamp=1436885395018). The CASA Board approved the charter in March 2013 and established the [**Odour Management Project Team**](http://casahome.org/CurrentInitiatives/OdourManagementTeam.aspx) (the OMT).

The team’s work was divided into seven cross-cutting topics, recognizing that some issues may be addressed under more than one topic. The OMT formed task groups to examine five of the topics in detail.

Each task group also advised the OMT on the remaining two topics—Continuous Improvement and Education, Communication and Awareness—as these topics pertained to the mandate of the OMT.

The five task groups included members of the OMT as well as individuals from other key stakeholder groups. Consultants were also engaged to assist in compiling and analyzing information. The OMT provided direction to each task group through a work plan and ongoing feedback as the tasks were undertaken. The final reports from each task group were presented to the OMT for review and acceptance, and the information was incorporated, as appropriate, in this guide.

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GLOSSARY

These terms have been defined in the context of the terms used in this guide and may not exactly conform to other common definitions for each term.

|  |  |
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| Adaptation (odour/olfactory)  |  The temporary, normal inability to distinguish a particular odour after a prolonged exposure to the odour. Sometimes called habituation. |
|  Aerobic |  Biological processes that require oxygen or are conducted in the presence of oxygen. |
|  Anaerobic |  Biological processes that do not require oxygen or are conducted in the absence of oxygen sources. Some anaerobic processes are known to produce intense offensive odours. |
|  Analytical |  A monitoring method that is quantitative and repeatable and where a single instrument collects and analyzes a sample. |
| Application |  An indication of whether the tool is appropriate for source or ambient assessments. For example, a continuous emission monitor is appropriate only for source odour emission rate estimation, not an ambient assessment, while remote sensing techniques are generally applicable to both kinds of assessments. |
|  Area Source |  A surface emitting source that can be solid (e.g., compost) or liquid (e.g., ponds, tanks). |
| Categorical Scale |  A means of systematically categorizing odour (hedonic tone and intensity) by means of a ranking scale, often from 0‐5 or 0‐7. |
|  Character |  An odour description which relates the odour to general categories and provides a scale on how intensely the odour matches the general category. The different categories often include floral, fruity, vegetable, earthy, offensive, fishy, chemical and medicinal. |
| Community Survey |  Community questionnaires to establish perception of odours within an area of investigation. |
| Continuous Emission Monitor  (CEM) |  A monitor typically used to measure air quality and odorants in the stacks of combustion sources. |
| Continuous Monitoring | Real time monitoring of air quality for individual or classes of compounds usually every few seconds and recorded and reported as average values over a 1 to 5 minute interval. |
| Detection to Threshold (D/T) |  A measure of the number of dilutions needed to make the odorous ambient air “non‐detectable.” |
|  Diffusibility |  A measure of the volatility of odorants which reflects the ability to reach the olfactory receptors in the human nose. |
|  Dilution Factor |  The ratio between sample flow or volume after dilution (total sample volume) and the flow or volume of the odorous gas (undiluted sample volume). |
|  Duration |  The length of time the odour is perceived in each occurrence. Short duration may be a few minutes. Long duration could refer to hours or days, although duration is relative. |
| Dynamic Dilution |  Dilution which is achieved by mixing two known flows of gas—odorous sample and neutral gas, respectively. |
|  Electronic Nose (E-nose) |  An instrument that attempts to reproduce the human olfactory system using sensors. |
|  Facility Type |  Existing or planned facilities.   |
|  Fatigue (odour) |  A decrease in sensitivity to an odour caused by a repetitive process of making and recording odour observations (note: not caused by adaption to an odour). |
| FIDOL |  An odour assessment framework that considers the characteristics of **f**requency, **i**ntensity, **d**uration, **o**ffensiveness and**l**ocation. |
|  Flux Chamber |  A device to isolate a surface area for collecting gaseous emissions. Nitrogen is usually used as a sweep gas. |
|  Frequency (as it relates to assessment) |  The rate at which odorant or odour can be assessed corresponding to the tool type. For example, a continuous emission monitor may sample and analyze odorants every few seconds. Ambient grab samples are usually made infrequently, perhaps once a week, and so are not likely to collect a sample during an infrequent odour event. |
| Fugitive Emissions | Unintended emissions from any openings, such as doors, windows, trucks waiting to load or unload odorous materials, valves, flanges, pumps, ponds and storage piles. Fugitive emissions can be parts of point, area or volume sources. |
| Gaussian Model |  A model in which plumes are assumed to have dimensions based on bell‐shaped curves. |
| Grab Bag/Canister |  A means of collecting a whole‐air sample. |
|  Hedonic Tone |  A subjective measure of the pleasantness or unpleasantness of an odour. |
|  Hydrocarbon | Chemical term describing an organic compound which contains hydrogen and carbon. These compounds are typically associated with certain processes and industries and some are very odorous. |
| Integrative Sampling |  The collection of samples at regular and specified time periods for a specified duration (e.g., for one hour or one day), also known as composite sampling. |
|  Intensity |  A characteristic of odour that describes the perceived strength and is rated by an odour assessor using a numerical system. |
|  Intermittent Sampling (as used in this guide) |  The use of containers, such as canisters, sample bags, adsorbent tubes or impinger solutions, to collect and concentrate the compounds prior to analysis. |
|  Japanese Odour Index (OIJ) |  A standardized dimensionless value that is a logarithmic function of odour concentration. See Odour Concentration.  |
|  Level of detail |  A determination of whether a method can be used to provide a high level of detail for odour assessments, or is useful as an indication of potential (e.g., a medium or low level of detail) which may require a subsequent more detailed confirmatory assessment. In this guide, detail refers to the number of odorants that can be addressed with a single measurement. |
|  Line Source |  An odour source which is long and narrow. This type of source is not common, however vehicle exhaust from roadways can be classified as a line source. |
| Location Sensitivity | An accounting for the type of land use and the nature of human activities. These factors determine the sensitivity of the receiving environment to odour.  |
| Monitoring |  The use of an instrument monitor or measuring device to observe changes in concentration of odour or odorants that may occur over time. |
|  Multi-source |  A facility, activity, location or operation which includes different odour sources such as point, area, volume and line.  |
|  Nuisance |  An adverse effect or impairment resulting from an odour. The type of impairment is related to circumstances that cause annoyance, loss of enjoyment and inconvenience. |
|  Objective |  Quantifiable through repeatable measurement. |
|  Odorant |  A specific gaseous compound that causes the sensation of odour. |
| Odour Concentration |  A dimensionless dilution ratio that is reported as the number of odour units in a cubic metre of gas at standard conditions. It is the threshold concentration at which an odour can be detected by 50% of a trained odour panel. |
| Odour Complaint Threshold Value (OCTV) |  The concentration at which 50% of a population, represented by the odour panel, will complain about an odour, as determined over a short time period. |
|  Odour Detection Threshold Value (ODTV) |  The concentration at which 50% of a population, represented in an olfactory experiment by an odour panel, would be expected to detect the odorant. |
|  Odour Diary |  A tool used for odour assessment, where an observer records the nature of odour and other characteristics on a regular basis and during odorous events. |
|  Odour Episode Characterization |  A description of an odour episode based on the FIDOL framework. |
|  Odour Intensity |  Perceived strength of an odour when detected by a recipient. See Categorical Scale. |
|  Odour Offensiveness Threshold Value (OFTV) |  The concentration at which 50% of a population, represented by the odour panel, indicates that the odour is offensive, as determined over a short time period. |
|  Odour Panel |  A group of assessors who are qualified to judge samples of odorous gas using dynamic olfactometry. |
| Odour Persistency |  A measure of how an odour’s intensity decreases as the concentration of the odorant decreases (i.e., as the odorant is diluted, such as downwind from an odorant source). |
| Odour Recognition Threshold Value (ORTV) |  The concentration at which 50% of a population represented by the odour panel recognizes the odour. |
|  Odour Unit (OU) |  One odour unit is the amount of odour present in one cubic metre of odorous gas (under standard conditions) at the panel threshold. |
|  Odour Wheel |  A means of documenting various odour characters in a circular chart, along with chemicals that are consistent with each character. |
|  Offensiveness |  The level of unpleasantness or disagreeability of an odour. |
|  Olfactometer |  An apparatus in which a sample of odorous gas is diluted with neutral gas in defined ratio and presented to panelists (assessors). |
| Olfactometric Analysis | The presentation to odour panel members of a sufficiently complete set of diluted samples to calculate the odour concentration for a sample. |
|  Olfactometry |  Measurement of the response of assessors to olfactory stimuli. |
| Passive Monitoring (as used in this guide) |  Passing a fixed volume of odorant through a glass tube packed with an adsorbent material. Determination of the concentration for a specific odorant relies on the change of colour of the adsorbent material when it is exposed to the compound. |
|  Point Source |  A type of source which is confined and has well-defined exhaust parameters (velocity, temperature, odour rate). They are single entity and easily identifiable. They can be elevated or located at ground level. |
|  Portable Olfactometer |  A portable instrument capable of measuring odour concentration in the ambient air without collection of the sample and transportation to a laboratory. |
|  Prevailing Winds |  The predominant wind direction at a certain location over a certain time period. |
|  Quantifiable |  An indication of whether a tool can provide quantifiable results (odour emission rates, odour concentrations or other numerical output), as opposed to documentation of sensory perceptions. |
| Receptor Modelling |  A method for determining the sources of air pollution based on air monitoring data. Receptor models use odorant (or odour) measurements at an individual monitoring site (the receptor) to calculate the relative contributions from major sources to the pollution/odour at that site. |
| Remote Sensing |  The acquisition of information about odour without making physical contact with the odour plume. |
|  Residence Time (as used in this guide) |  The duration that a specialized process requires to be completed. |
|  Sampling | The process of obtaining representative information on the typical characteristics of an odour source by means of the collection of a suitable volume fraction of effluent or ambient air. |
| Semi‐Continuous Monitoring |  Measuring concentrations over minutes to hours. |
| Sensitive Receptor |  An odour receptor with the potential to be adversely affected by exposure to odours. Residential and certain institutional land uses (hospitals, care facilities, schools, places of worship) are typically considered as sensitive receptors.   |
|  Static Hood |  Isolates a part of a gaseous emitting surface and directs the gases into the hood outlet duct for the odour sample collection. |
|  Subjective |  Based on feelings of an odour observer of liking, pleasure, acceptance, and valuation. |
|  Target | The target of the assessment, or capability of the method, and its appropriateness for individual odorants, groups of odorants or odour. |
| Volatile organic compounds (VOC) |  Organic chemicals with high vapor pressure at room temperature. |
|  Volatility |  A fundamental parameter for assessing the capacity of a substance to be an odorant. See Diffusibility. |
| Volume Source |  A source of diffuse emissions from a volume (as opposed to a surface or a point). Examples are buildings and plant process areas. |
| Wind Tunnel |  A device to isolate a surface area for collecting gaseous emissions with the capability to regulate the air velocity inside the device. |

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ACRONYMS

|  |  |
| --- | --- |
| AQHI | Air Quality Health Index |
| AEP | Alberta Environment and Parks |
| AER | Alberta Energy Regulator |
| ASTM | American Society for Testing and Materials |
| CASA | Clean Air Strategic Alliance |
| CEM | Continuous emission monitor |
| CFD | Computational Fluid Dynamics |
| CIC | Coordination and Information Centre (Alberta) |
| DEFRA | Department of Environment, Food, and Urban Affairs (United Kingdom) |
| D/T | Detection to Threshold |
| ESRD | Alberta Environment and Sustainable Resource Development (now called Alberta Environment and Parks) |
| FIDOL | Frequency, Intensity, Duration, Offensiveness and Location |
| H2S | hydrogen sulphide |
| m | metre |
| m3 | cubic metre |
| m3/s | cubic metres per second |
| MSW | municipal solid waste |
| NRCB | Natural Resources Conservation Board (Alberta) |
| OCTV | Odour Complaint Threshold Value |
| ODTV | Odour Detection Threshold Value |
| OFTV | Odour Offensiveness Threshold Value |
| OIJ | Japanese Odour Index |
| OMT | CASA Odour Management Team |
| ORTV | Odour Recognition Threshold Value |
| OU | odour unit |
| PDCA | Plan-Do-Check-Act |
| ppb | parts per billion |
| ppbv | parts per billion by volume |
| ppm | parts per million |
| ppmv | parts per million by volume |
| SAGD | steam‐assisted gravity drainage |
| SPR | Source-Pathway-Receptor |
| μg/m3 | micrograms per cubic metre |
| U.S. | United States |
| U.S. EPA | United States Environmental Protection Agency |
| VDI | Verein Deutscher Ingenieure |
| VOC | volatile organic compound |
| WHO | World Health Organization |

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REFERENCES

This guide was compiled using information from the following reports:

Any specific references to reports or source documents within the text of this guide is available in these report and can be accessed online at [**casahome.org**](http://casahome.org/).

**Health Task Group**

* + [***Odour and Health Backgrounder***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/Odour%20and%20Health%20Backgrounder_FINAL%2030JAN2015.pdf?timestamp=1436886776432)
	+ *Symptom and Odour Tracking Tool*

**Complaints Task Group**

* + [***Alberta Odour Complaints Overview***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/Alberta%20Odour%20Complaints%20Overview_31MAR2014.pdf?timestamp=1436886690903)
	+ [***Odour Complaints in Your Area: A Guide for Developing an Odour Complaint Process***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/Odour%20Complaints%20in%20Your%20Area%20Booklet%20_APR2015_Final.pdf?timestamp=1436886825983)
	+ *Odour Complaint Referral Process*

**Odour Assessment Task Group**

* + [**Review of Odour Assessment Tools and Practices for Alberta*.***](http://casahome.org/LinkClick.aspx?fileticket=P-9teU5NWU4%3d&portalid=0&timestamp=1436887677750)Prepared for the task group byMillennium EMS Solutions Ltd., and Environmental Odour Consulting. 2015.
	+ *CASA Odour Assessment Guide*

**Prevention and Mitigation Task Group**

* + [***Review of Odour Prevention and Mitigation Tools for Alberta***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/PMTG%20Pinchin%20Final%20Report%20w%20Appendices%202015-01-27.pdf?timestamp=1436886856110)*.* Prepared for the task group by Pinchin, Ltd. 2015.

**Enforcement and the Role of Regulation Task Group**

* + [***Report to the Clean Air Strategic Alliance Odour Management Team Enforcement/Role of Regulation Task Group: Final Report***](http://casahome.org/Portals/0/documents/Odour%20Management/Consultant%20Reports/ERoRTG%20RWDI%20Review%20Final%20Report%20150311%20CASA.pdf?timestamp=1436886730219)*:*Prepared for the task group by RWDI AIR Inc. 2015.